

**What is Claimed is:**

1. An in-line chemical feed pump for a foam dispenser system, comprising:  
an inlet conduit for receiving chemical fluid;  
a pump head in chemical fluid communication with said inlet conduit;  
5 an outlet conduit in chemical fluid communication with said pump head;  
a driver;  
a pump drive transmission system positioned in drive transmission communication  
between said driver and pump head, said pump drive transmission system including a magnetic  
coupling with first and second magnetic coupling members placed to opposite sides of an  
10 intermediate protective shroud, and wherein said shroud has a coupling reception cavity which  
receives one of said first and second magnetic coupling members.
2. The pump of claim 1 wherein said first magnetic coupling member receives drive  
transmission forces from said driver and said second magnetic coupling member receives drive  
transmission forces via magnetic coupling forces from said first magnetic coupling member  
15 passing through said shroud, and wherein said second magnetic coupling member extends into  
the coupling reception cavity.
3. The pump of claim 1 wherein said shroud has a cylindrical side wall defining said  
coupling reception cavity and said first magnetic coupling member includes an annular magnetic  
coupling ring extending about said cylindrical side wall, and said second coupling member has a  
20 magnetic coupler positioned within said shroud and magnetically coupled with the annular  
magnetic coupling ring.
4. The pump of claim 3 wherein said annular magnetic coupling ring has multiple  
poles.

5. The pump of claim 1 wherein said second magnetic coupling member includes a protective covering which contacts chemicals received within said shroud during pump operation.

6. The pump of claim 1 wherein said shroud has a cup-shaped configuration.

5 7. The pump of claim 1 further comprising a seal and an outlet manifold defining said outlet conduit, and wherein said shroud has a base flange section that is supported by said outlet manifold, and wherein said seal is positioned between said flange and outlet manifold.

8. The pump of claim 1 further comprising an outlet manifold and wherein said outlet manifold has a shaft reception cavity, and said drive transmission system further  
10 comprising a coupling shaft received within the shaft reception cavity of said outlet manifold and positioned to transmit drive forces from said second magnetic coupling member to said pump head, a first bearing member received within said outlet manifold shaft reception cavity and in a bearing support relationship with said coupling shaft, and a second bearing member that is in bearing contact with said coupling shaft and spaced apart from said first bearing member axially  
15 along said shaft.

9. The pump claim 8 wherein said bearing members include a caged roller bearing assembly, and wherein said second bearing member is positioned at an intermediate region of said outlet manifold and said first bearing member is received within a reception cavity positioned at an upper end region of said outlet manifold.

20 10. The pump of claim 8 wherein said coupling shaft includes first and second shoulder rings axially spaced along said shaft and supporting said first and second bearing members, and said first and second bearing members are each received within the shaft reception cavity of said outlet manifold.

11. The pump of claim 8 wherein said coupling shaft has an upstream connection end received by said second magnetic coupling member and a downstream end.

12. The pump of claim 11 further comprising a flex coupling positioned in line between said second magnetic coupling member and said pump head and connected with said coupling shaft.

13. The pump of claim 1 wherein said first magnetic coupling member is cup shaped and has a cavity within which said shroud extends.

14. The pump of claim 1 wherein said first magnetic coupling member, said shroud, and said second magnetic coupling member are in a nested arrangement.

15. The pump of claim 1, further comprising an outlet manifold defining said outlet conduit and a coupling housing having a first end region in contact with said driver and a second end region in contact with said outlet manifold, and said coupling housing having an essentially common radius as said outlet manifold and a housing of said driver.

16. The pump of claim 1 further comprising an outlet manifold defining said outlet conduit and wherein said shroud includes a cylindrical side wall, an upper cap and a lower contact end which is supported by said outlet manifold, and said first magnetic coupling member includes a shroud reception cavity for receiving an upper region of said shroud, and said second magnetic coupling member is received within a cavity defined by an inner surface of the side wall of said shroud.

17. The pump of claim 16 wherein the lower contact end of said shroud includes an annular flange, and said chemical feed system further comprising a seal positioned between said flange and an upper surface of said outlet manifold.

18. The chemical feed system for a foam dispenser, comprising:

a motor with a drive shaft;

a pump unit;

a drive transmission system in line between said motor and pump unit, said drive transmission system comprising a magnetic coupling assembly having a first magnetic coupling member and a second magnetic coupling member and an intermediate shroud positioned between  
5 said first and second magnetic coupling members and sealing fluid within said pump unit; and  
wherein said shroud has a chemical reception cavity into which chemical flows.

19. The system of claim 18 wherein said first magnetic coupling member, said second magnetic coupling member and said shroud are arranged such that a horizontal cross-sectional  
10 plane extends through each of said first and second coupling members.

20. The system of claim 18 wherein said shroud includes a cylindrical side wall, an upper cap and a lower end, and said first magnetic coupling member includes a shroud reception cavity for receiving an upper region of said shroud, and said second magnetic coupling member is received within the chemical reception cavity defined by an inner surface of the side wall of  
15 said shroud.

21. The chemical feed system as recited in claim 18 further comprising a transmission shaft having a drive transmission upstream end received within said second magnetic coupling member and a downstream end, and wherein said first magnetic coupling member has a raised upper section with threaded aperture for receiving the drive shaft of said motor.

20 22. The chemical feed system as recited in claim 18 wherein said shroud has a cylindrical side wall and an upper cover which together define a sealed chemical reception cavity in which one of said first and second magnetic coupling members is received.

23. The chemical feed system as recited in claim 22 wherein a magnetic ring portion of said second magnetic coupling member is fully received within the chemical reception cavity of said shroud.

24. The chemical feed system as recited in claim 23 wherein said drive transmission system includes a drive transmission shaft, and said pump unit includes an inlet pump manifold and an outlet pump manifold with said shroud fastened to said outlet pump manifold, and said outlet pump manifold includes a manifold reception cavity within which said drive transmission shaft axially extends, and said drive transmission shaft is supported by a first bearing device also received within the manifold reception cavity of said output pump manifold.

25. The chemical feed system as recited in claim 24 further comprising a second bearing device also received within said manifold reception cavity to provide bearing support to said drive transmission shaft and which second bearing device is axially spaced apart from said first bearing device.

26. The chemical feed system as recited in claim 25 wherein said drive transmission shaft has an enlarged section positioned between two radially smaller sections, and said first and second bearing sections being received within said two radially smaller sections.

27. The chemical feed system as recited in claim 18 wherein said drive transmission system comprises a flexible coupling in line between said second magnetic coupling member and said pump unit.

28. The chemical feed system as recited in claim 18 further comprising a connection pin which connects said pump drive connector to the drive component of said pump unit.

29. A chemical feed system for a foam dispenser system comprising:  
a motor with a drive shaft;

a pump unit;

magnetic coupling means for transmitting force from the drive shaft of said motor to said pump unit while retaining said drive shaft free from chemical contact, said magnetic coupling means including a first magnetic coupling member, a separating device and a second magnetic coupling member with said separating device extending into a reception cavity formed in said first magnetic coupling member.

30. The chemical feed system as recited in claim 29 wherein said separating device includes a shroud with an interior reception cavity and the second magnetic coupling member extends into the interior reception cavity provided by said shroud.

31. A chemical supply system for a foam dispensing system, comprising:

first and second chemical sources;

a dispenser system;

first and second in-line pump assemblies in line between said dispenser system and said chemical source, and wherein

each of said first and second pump assemblies comprise the chemical supply system of claim 29.

32. The chemical supply system as recited in claim 31 wherein said dispenser system includes a base support and said dispensing system including a foam dispenser and a dispenser support connected to said base support; and said first and second in-line pump assemblies are supported by said base support.

33. The chemical supply system as recited in claim 32 wherein said base support includes rollers.

34. The chemical supply system as recited in claim 31 further comprising first and second chemical supply hoses extending between said first and second chemical sources and respective in-line pump assemblies, and first and second heater hoses extending between respective in-line pump assemblies and said dispenser system.

5           35. The chemical supply system as recited in claim 34 wherein said chemical supply hoses each have a manifold end which includes a stop valve and means for attachment of said manifold ends to respective inlet ports of said in-line pump assemblies.

36. A chemical feed system for a foam dispenser system, comprising:

a pump with a pump head and an inlet conduit;

10           a chemical supply line with an input valve assembly adapted for releasable attachment to said pump and fixed to the chemical supply line; and

said input valve assembly having a valve for stopping flow of chemical into said inlet conduit.

37. The feed system as recited in claim 36 further comprising a dispenser and a  
15 chemical feed line having an upstream end connected to said pump and a downstream end adapted for connection with said dispenser, and said chemical feed line having a heater extending therealong.

38. The feed system as recited in claim 37 wherein said chemical feed line has a length of 40 feet or less and said chemical supply line has a length of greater than 40 feet.

20           39. The chemical feed system as recited in claim 37 further comprising an output valve provided in line between an inlet region of said chemical feed line and an output of said pump.

40. The chemical feed system for claim 36 wherein said input valve assembly has a fastener which secures said input valve assembly to an inlet housing defining said inlet conduit.

41. The chemical feed system of claim 36 further comprising a seal device which seals off a chemical passageway exchange between said input valve mechanism and a housing  
5 defining said inlet conduit.

42. The chemical feed system of claim 36 further comprising an inlet manifold flow stopper which is dimensioned to preclude back flow out of said inlet manifold when said input valve mechanism is detached from said inlet manifold.

43. A chemical feed system for a foam dispenser, comprising:  
10 a inlet pump housing;  
an outlet pump housing;  
a pump head for directing chemical from said inlet pump housing to said outlet pump housing;  
a driver;  
15 a magnetic coupling which is positioned for drive transmission coupling of said driver and said pump head;  
a coupling housing which houses said magnetic coupling and extends between said driver and outlet manifold and within which is received said magnetic coupling.

44. The chemical feed system as recited in claim 43 wherein said coupling housing  
20 has a first upper end which receives said motor and a lower end which receives said outlet pump manifold and encompasses said magnetic coupling.

45. The chemical feed system as recited in claim 46 wherein said coupling housing is a cylindrical sleeve.



46. A method of feeding chemical to a foam dispenser, comprising:  
introducing chemical to an inlet port of an inlet pump manifold;  
pumping the chemical with a pump head outputting the chemical through an outlet pump manifold, and

5 wherein pumping the chemical includes driving a pump drive shaft with a magnetic coupling assembly which includes shroud and first and second annular magnetic coupling members each receiving a respective one of a motor drive shaft and downstream transmission shaft, and with said shroud having a reception cavity receiving said second magnetic coupling member.

10 47. A chemical feed system for a foam dispenser system, comprising:  
a motor with encoder;  
a pump unit;  
a magnetic coupling drive transmission system in line between said motor and pump unit;  
and a control system for monitoring pump drive characteristics.

15 48. The chemical feed system as recited in claim 49 wherein said motor is a brushless DC motor with an encoder communicating with said control system.